

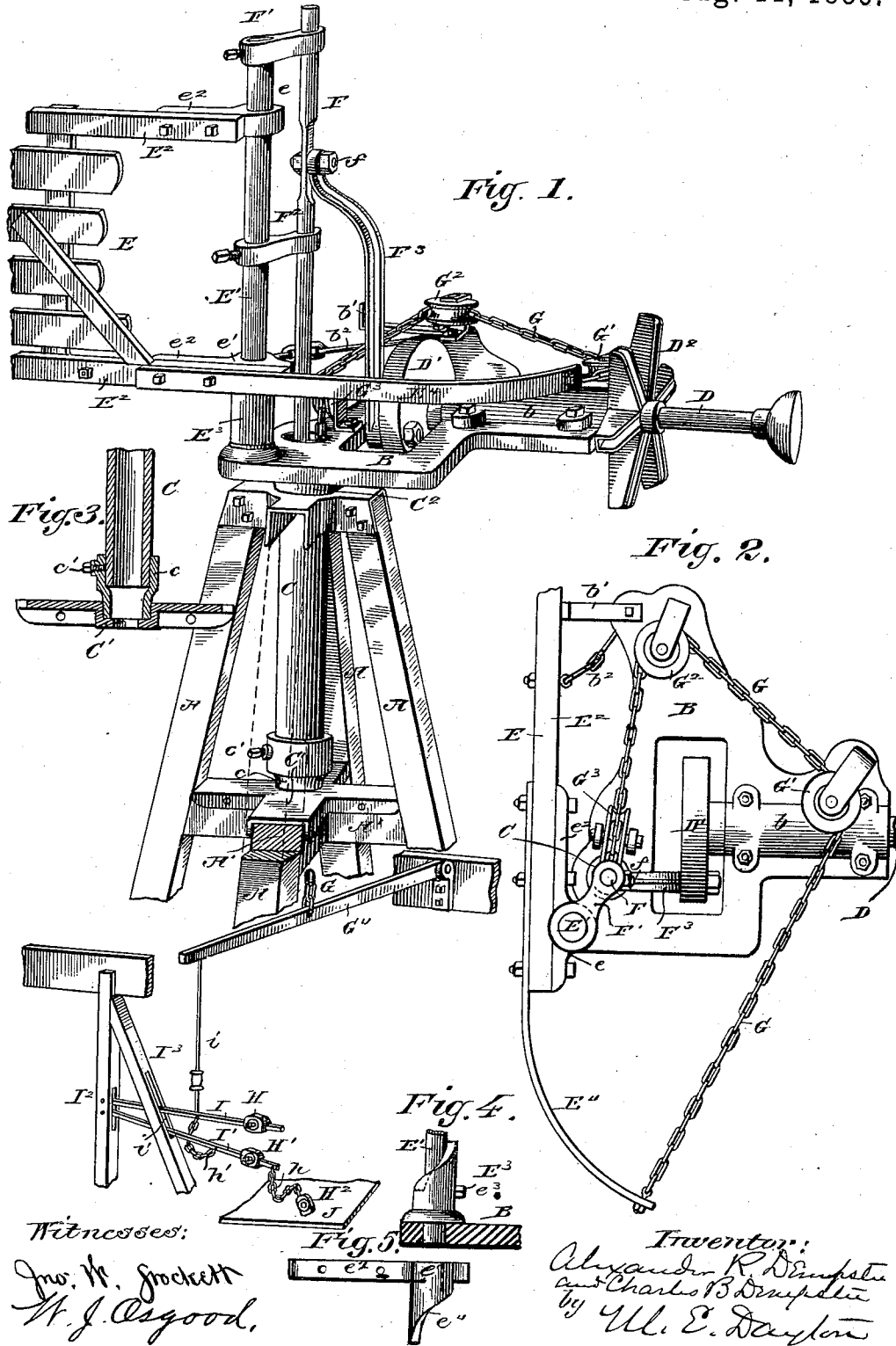
(No Model.)

A. R. & C. B. DEMPSTER.

WINDMILL.

No. 324,092.

Patented Aug. 11, 1885.



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WINDMILL.

SPECIFICATION forming part of Letters Patent No. 324,092, dated August 11, 1885.

Application filed November 10, 1884. (No model.)

To all whom it may concern:

Be it known that we, ALEXANDER R. DEMPSTER and CHARLES B. DEMPSTER, of Beatrice, in the county of Gage and State of Nebraska, have invented certain new and useful Improvements in Windmills; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of solid-wheel windmills in which the wheel is constructed to swing automatically more or less out of the wind, and to thereby adjust itself to the force of the latter, in order to maintain an approximately uniform rate of motion of the wheel in a variable wind, and to protect the wheel and the connected parts from injury.

The object of this invention is to provide simple, inexpensive, and effective devices in the class of windmills mentioned by which they are made self-adjusting, are easily and quickly thrown out of action when desired, and are adapted to operate without unnecessary loss of power through the frictional contact of their parts.

To this end the invention consists of matters hereinafter fully set forth, and defined in the appended claims.

In the accompanying drawings, which represent a windmill embodying the present invention, Figure 1 is a perspective view, the hub only of the wheel being shown, illustrating the parts in their relative positions when the wheel is fully facing the wind. Fig. 2 is a plan of the same as it appears when the wheel is out of action, the outwardly-projecting end of the horizontal shaft on which the wheel is mounted being represented as broken off, Fig. 3 is a vertical axial section of a step on which the turn-table is rotatably supported. Fig. 4 is a side elevation in detail of an inclined support on which the vane rests. Fig. 5 is a side elevation in detail of the part of the frame of the vane engaged with the said inclined surface.

As shown in the drawings, the operative parts of the windmill are mounted on a tower formed of four masts, A, having horizontal tie-beams A' to hold the masts rigidly in po-

sition, and also to furnish support for the lower bearing of a hollow rotating shaft, C, to the upper end of which the turn-table B is attached. The latter is rigidly secured in a horizontal position to the top of the shaft C, the lower end of which rests in and is supported by a step-bearing, C', bolted to the cross-beams A', and the upper end of which is journaled in a bearing, C², bolted to the posts A. The shaft C is thus maintained in a vertical position, and is at the same time free to rotate upon its vertical axis.

Upon the top of the turn-table B a horizontal bearing, b, is provided for the wheel-shaft D, the axis of the wheel being located slightly at one side of the vertical axis of the turn-table, so that the pressure of the wind upon the wheel will tend to rotate the latter so as to bring it edgewise to the wind, in a well-known manner. A vertical cylindrical rod or post, E', is rigidly fixed in the turn-table and extends upwardly therefrom to form a support for a rotating vane, E. The said rod E' is preferably located upon the turn-table at a point somewhat in the rear of its axis and at some distance laterally therefrom, and at a greater distance from the axis of the shaft D. The vane E is pivoted to the stake E' by bearings e e', which are made to rotate freely and also slide vertically upon said stake. The principal horizontal members E² E² of the vane-frame are bolted to rearwardly-extended arms e², formed upon the bearings e e', and to these members are secured the necessary parts to make the vane rigid and to give it a sufficient surface for the wind to act upon. The rotary motion of the vane on its pivot is limited when it is turned to throw the wheel out of the wind by an arm or bracket, b', bolted to the turn-table B, and in the opposite direction by a chain or coupled rods, b², connected with the vane and with the turn-table, as clearly shown in Fig. 2. The vane E is supported from vertical movement by means of an annular casting or sleeve, E³, surrounding the lower part of the rod E' and resting in contact with the top face of the turn-table, the said casting being, as shown, immovably secured to the said rod by a set-screw, e³. The sleeve E³ is provided with a cam-shaped upper edge, made of inclined or spiral form, and its spiral sur-

face is engaged by a corresponding cam-surface formed on the lower end of a downwardly-extended tubular part or sleeve, e^t , of the bearing e' . The weight of the vane is carried upon these cam-surfaces, so that when the turn-table is forced around to bring the wheel into the wind the vane is lifted, and when the force is withdrawn the weight of the vane causes the turn-table to rotate back to its former position, thus throwing the wheel out of the wind. Either one of these spiral surfaces may be dispensed with and a friction-roller mounted in suitable bearings attached in its place, and the same results will thereby be obtained. In the latter case the spiral may be made with a gradually increasing or decreasing inclination to a horizontal plane, in order to make it act with more or less force at different parts of its surface to turn the wheel out of the wind. The construction shown is, however, preferred as being more simple and less liable to get out of order.

By pivoting the vane to the turn-table by means of the post or pivot-rod E' , instead of rotatably mounting it on said turn-table concentric with the vertical axis of the latter, the frictional surfaces of the pivot-joint may be made very much smaller in diameter, whereby the machine is made lighter and cheaper and the friction on said surfaces is materially reduced. The wheel is rotated to bring it into the wind, in opposition to the tendency of the weight of the vane acting upon its inclined support to throw the wheel out of the wind, by means of a chain or cable, G , which is attached to an arm, E' , rigidly fastened to the vane and extended forward from its axis, or, in other words, in a direction from said axis approximately opposite to that in which the vane extends. From said arm the chain passes around a guide-pulley, G' , pivoted to the forward part of the turn-table, to give the force exerted through it the proper direction to bring the wheel into the wind, thence around a second guide-pulley, G^2 , to clear the crank-disk D' , and, finally, over a third guide-pulley, G^3 , to give it a direction downward through the hollow shaft C . At a convenient height above the ground the chain G is attached by a swivel to a lever, G^4 , which latter is pivoted to any convenient part of the frame-work of the tower, and is drawn downward to actuate the chain and bring the wheel into the wind, preferably by a series of two or more weights, such as H and H' . These weights may be attached in any convenient manner to the end of the chain G , so that they will be successively lifted as the chain rises; but the construction shown in the drawings is considered desirable, as it is simple and effective. As shown, two of these weights, H and H' , are adjustably mounted on levers I and I' , which latter are pivoted to swing vertically on a fixed post, I^2 , and are prevented from swinging laterally by engagement with the slot i' in the fixed brace I^3 . The weights H and H' are provided with apertures by which they are hung on said levers, and they are ad-

justably secured to said levers by set-screws, as shown. The weight H^2 is fastened to the outer end of the lever I' by a short chain, h , the two levers are secured to each other by a similar chain, h' , and the lever I is connected to the lever G^4 by a rod or link, i . As the wheel, actuated by the weights, is drawn into the wind the chain G moves downward and the weight H^2 first rests on a platform, J , or other support; the lever I' next rests in the bottom of the slot i' ; and, finally, when the chain G is at its lowest position, the lever I rests upon the lever I' , and the chain G is thus relieved from all of these weights. This will, however, only occur in the lightest wind to which the wheel is adjusted, as the tendency of the wind acting on the wheel, assisted by the weight of the vane acting on the inclined surfaces of the parts E^2 and e^t , is to rotate the wheel so as to carry it out of the wind. When the wheel turns from the wind, the weights are lifted successively, whereby the series, as a whole, is adapted to exert a constantly-increasing force to retard the further progress of the wheel in that direction. The rate of increase of said force may be regulated by lengthening or shortening the chains that connect the weights, and the amount of said force may be augmented or diminished by moving the weights H and H' toward or away from the pivotal points of the levers on which they are hung. The length of the chain G may be so regulated that one or more of the weights shall always be suspended from the lever G^4 to act on the chain G and keep the wheel in the wind against a wind of any given force.

The construction above described is well adapted to permit the wheel to turn more or less from the wind in proportion to the velocity of the latter, whereby an approximate uniformity of speed of the wheel is secured, and injury to it or the connected parts thereby prevented.

The wheel may be stopped by disconnecting the weights above described, or by lifting the lever G^4 and fastening it in an elevated position, and the wheel will turn at once out of the wind and remain inoperative until the action of the weights on the chain G is restored.

In the particular construction of the parts of the windmill herein shown, the post E' , on which the vane B is pivoted, is utilized as a support for two brackets, F' F^2 , provided upon their outer ends with bearings in which the plunger-rod F is mounted to slide, and the additional weight and cost of a standard or bracket especially formed on or attached to the turn-table for that purpose is thereby saved. The rod F may be attached by a swivel-joint, in any usual manner, to the apparatus, by means of which the power generated in the windmill is utilized. A pitman, F^3 , is, as herein shown, connected at one end to the rod F by a suitable pivot-pin, f , fixed in said rod, and at the other end engages a suitable crank-pin on the crank-disk D' , fixed on the wheel-shaft D , whereby a vertically-reciprocating motion is

imparted to the rod F by the revolution of the wheel on its axis. D² is the hub or spider to which the arms of the wheel are attached.

Any of the well-known forms of "solid" wheel or wheels with fixed sails or slats may be used in connection with the devices herein illustrated, and it is therefore unnecessary to further describe the construction of the wheel.

The shaft C, by which the turn-table is supported, is preferably made in the form of a cylindrical tube of sufficient size and strength to resist the transverse strains to which it may be subjected, and its lower end, where it enters the bearing C', is made smaller than its body, in order to reduce the area of frictional contact of the parts in bearing. For this purpose a reducer, c, in the form of an ordinary "reducer," such as is used by gas-fitters to connect pipes of different sizes, is secured by a set-screw, c', or otherwise rigidly attached, to the lower end of the shaft C, and the lower end of this piece c is fitted to rotate in the step-bearing C'. A central aperture is made in the latter for the passage of the rod F and the chain G, in order that these parts may remain in substantially the same position when the turn-table rotates on its vertical axis.

We are aware that it has been proposed heretofore to utilize the weight of a wind-vane to hold the wind-wheel into the wind by employing, to support the weight of the vane, an inclined surface so arranged that the vane will tend by its gravity to remain at right angles with the wheel.

The novel construction herein shown as embodying our invention differs from that last above described in having a vertically-movable vane resting upon an inclined surface arranged to hold the vane parallel with the wheel, operating in connection with a weight or weights connected with the vane in such manner as to tend to draw the vane into a position at right angles with the wheel in opposition to the tendency of the gravity of the vane to throw the wheel out of the wind, as set forth in the appended claims.

We claim as our invention—

1. The combination, with a turn table and a wind-wheel mounted thereon, of a vane pivoted to said turn-table on a vertical axis and constructed to slide vertically upon its pivot, a circular projection or sleeve secured upon the turn-table concentric with the pivotal axis of the vane, and having an inclined upper surface and a depending part upon the vane adapted to rest upon the inclined surface of the sleeve, said parts being so constructed that the weight of the vane tends to turn the wheel out of the wind, and a weight or weights applied to draw the vane into position to hold the wheel into the wind, substantially as described.

2. The combination, with a turn-table and a wind-wheel mounted thereon, with its axis of rotation at one side of the vertical axis of the turn-table, of a vane pivoted to said turn-table on a vertical axis and constructed to

slide vertically upon its pivot, a circular projection or sleeve secured upon the turn-table concentric with the pivotal axis of the vane, and having an inclined upper surface, and a depending part upon the vane adapted to rest upon the inclined surface of the sleeve, said parts being so constructed that the weight of the vane tends to turn the wheel out of the wind, and a weight or weights applied to draw the vane into position to hold the wheel into the wind, substantially as described.

3. The combination, with a turn-table and wind-wheel mounted thereon, with its axis of rotation at one side of the vertical axis of the turn-table, of a vertical pivot rod, E', fixed upon the turn-table, a sleeve, E², located upon the turn-table concentric with the pivot-rod and having an inclined upper surface, and a vane, E, pivoted to the rod by bearings constructed to slide upon the latter and provided with a depending tubular projection, e', having an inclined face engaged with the corresponding face upon the sleeve, the said inclined faces being so arranged that the weight of the vane tends to turn the wheel out of the wind, and a weight or weights applied to draw the vane into position to hold the wheel into the wind, substantially as and for the purpose set forth.

4. The combination, with a turn-table and a wind-wheel mounted thereon, of a vane pivoted to said turn-table on a vertical axis and constructed to slide vertically upon its pivot, a circular projection or sleeve secured upon the turn-table concentric with the pivotal axis of the vane, having an inclined upper surface, a depending part upon the vane resting upon the said inclined surface of the sleeve, whereby the weight of the vane will tend to retain the latter parallel with the wind-wheel, a chain connected with the said vane, a weight or weights attached to said chain for drawing the vane into position at right angles to the wheel, and suitable guide-pulleys upon the turn-table for the said chain, substantially as and for the purpose set forth.

5. The combination, with a turn-table and a wind-wheel mounted thereon, with its axis of rotation at one side of the vertical axis of the table, of a vane pivoted to said turn-table, a chain connected with said vane and adapted to move the latter so as to bring the wheel-face to the wind, suitable guide-pulleys for the chain upon the turn-table, and a series of weights connected with the chain and adapted to come successively into action as the latter is drawn upwardly by the pressure of the wind upon the wheel, substantially as and for the purpose set forth.

6. The combination, with a turn-table and wind-wheel mounted thereon, with its axis of rotation at one side of the vertical axis of the table, of a vane pivoted to said turn-table upon a vertical axis and constructed to slide vertically upon its pivot, a curved projection or sleeve upon the turn-table concentric with the axis of the vane, having an inclined upper surface, a depending part or projection upon

the vane resting upon the said inclined surface, whereby the weight of the vane tends to throw the said vane into a position parallel with the wheel, and the latter out of the wind, 5 a chain connected with the vane adapted to move the latter so as to bring the wheel-face to the wind, and a series of weights connected with the chain and adapted to come successively into action as the latter is drawn up- 10 wardly by the pressure of the wind upon the wheel, substantially as described.

7. The combination, with a turn-table and a wind-wheel mounted thereon, of a vane mounted upon the turn-table, a chain, G, connected 15 with the vane for moving the latter, suitable guide-pulleys for the chain upon the turn-table, one or more levers, as I I', pivoted one above another to a stationary support, the upper lever being connected with the said 20 chain G, adjustable weights upon the said levers, and a chain, h', joining the levers, substantially as and for the purpose set forth.

8. The combination, with a turn-table and a wind-wheel mounted thereon, of a vane 25 mounted upon the turn-table, a chain, G, connected with the vane for moving the latter, suitable guide-pulleys upon the turn-table for the chain, one or more levers, as I I', pivoted one above the other to a stationary support, the upper lever being connected with the chain 30 G, adjustable weights upon said levers, a chain, h', joining the levers, and a weight, H², connected by a chain with the lower lever, and a stationary support for the said weight H², substantially as and for the purpose set forth. 35

In testimony that we claim the foregoing as our invention we affix our signatures in presence of two witnesses.

ALEXANDER R. DEMPSTER.
CHARLES B. DEMPSTER.

Witnesses:

R. S. BIBB,
ALF. PARKER.